DOCUMENT RESUME

ED 259 319 CS 008 103

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TITLE When Will Children Acknowledge Failures of Word Comprehension?
PUB DATE Apr 85
NOTE 19p.; Paper presented at the Meeting of the Society for Research in Child Development (Toronto, Ontario, Canada, April 25-28, 1985).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Decoding (Reading); Elementary Education; Error Patterns; Grade 3; Grade 5; *Metacognition; Miscue Analysis; Reading Achievement; *Reading Comprehension; Reading Processes; *Reading Research; Reading Strategies; *Word Recognition
IDENTIFIERS *Comprehension Monitoring

ABSTRACT

A study was conducted to determine whether word length and sentence position influence the likelihood that a child will acknowledge that a word has disrupted comprehension of a reading passage. In the first task, third and fifth grade skilled and less-skilled readers read 16 short paragraphs containing nonsense words and reported whether the paragraphs contained anything that might be hard for another child to understand. All children were more likely to identify the three-syllable nonwords than the one syllable nonwords as problematic, suggesting that children are hesitant to say that a short word is unfamiliar because they think it is a word they ought to know. This was particularly true for the third grade subjects. The effect of sentence position (noun vs. adjective) was minimal, suggesting that children, in contrast to adults, may not perceive nouns as more crucial to comprehension than adjectives. In the second task, subjects evaluated the relative comprehensibility of pairs of sentences in which the nonsense words contrasted in sentence position, number of syllables, or both. As with the first task, third grade students were more likely than fifth grade students to focus on word length in making judgments of comprehensibility. Surprisingly, however, it was often the adjective that was perceived as more crucial to comprehension than the noun. (HTH)

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When Will Children Acknowledge Failures Of Word Comprehension?

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Paper presented at the meeting of the Society for Research in Child Development, Toronto, April 1985.

CS008103

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ABSTRACT

WHEREAS SOME STUDIES OF COMPREHENSION MONITORING HAVE FOUND THAT CHILDREN ARE QUITE LIKELY TO IDENTIFY INDIVIDUAL WORDS WHICH DISRUPT PASSAGE COMPREHENSION, OTHERS HAVE FOUND THAT CHILDREN SELDOM ACKNOWLEDGE WORD-LEVEL PROBLEMS. POSSIBLE REASONS FOR THIS DISCREPANCY WERE EXAMINED IN A STUDY INVOLVING THIRD AND FIFTH GRADERS, IDENTIFIED AS SKILLED AND LESS-SKILLED READERS. IN THE FIRST TASK, SUBJECTS READ 16 SHORT PARAGRAPHS CONTAINING NONSENSE WORDS VARYING ALONG TWO DIMENSIONS: NUMBER OF SYLLABLES (1 VS. 3) AND POSITION IN THE SENTENCE (NOUN VS. ADJECTIVE). CHILDREN WERE ASKED TO REPORT WHETHER THE PARAGRAPHS CONTAINED ANYTHING THAT MIGHT BE HARD FOR ANOTHER CHILD TO UNDERSTAND. NUMBER OF SYLLABLES AFFECTED THE PROBABILITY OF REPORTING A NONSENSE WORD; ALL CHILDREN WERE MORE LIKELY TO IDENTIFY THE THREE-SYLLABLE NONWORDS AS PROBLEMATIC, THOUGH THE EFFECT WAS GREATER FOR THE THIRD GRADERS. THIS OUTCOME REFLECTS A RESPONSE BIAS SUCH THAT CHILDREN ARE HESITANT TO SAY THAT A SHORT WORD IS UNFAMILIAR BECAUSE THEY THINK IT IS A WORD THEY OUGHT TO KNOW. THE EFFECT OF SENTENCE POSITION WAS MINIMAL, SUGGESTING THAT CHILDREN, IN CONTRAST TO ADULTS, MAY NOT PERCEIVE NOUNS TO BE MORE CRUCIAL TO COMPREHENSION THAN ADJECTIVES. OVERALL, BETTER READERS IDENTIFIED MORE NONSENSE WORDS THAN POORER READERS, BUT SKILL LEVEL DID NOT INTERACT WITH OTHER FACTORS. IN THE SECOND TASK, SUBJECTS EVALUATED THE RELATIVE COMPREHENSIBILITY OF PAIRS OF SENTENCES IN WHICH THE NONSENSE WORDS CONTRASTED IN SENTENCE POSITION, NUMBER OF SYLLABLES OR BOTH. AGAIN, THIRD GRADERS WERE MORE LIKELY THAN FIFTH GRADERS TO FOCUS ON WORD LENGTH IN MAKING JUDGMENTS OF COMPREHENSIBILITY. MANY OF THE FIFTH GRADERS MADE MEANING-BASED JUDGMENTS, BUT, UNEXPECTEDLY, IT WAS OFTEN THE ADJECTIVE THAT WAS PERCEIVED AS MORE CRUCIAL TO COMPREHENSION THAN THE NOUN.

One of the many factors affecting a reader's comprehension of text is the presence of unfamiliar vocabulary. Accordingly, one of the many standards readers should use when evaluating their own comprehension is the lexical standard (Baker, in press). The extent to which children evaluate their understanding of individual words has been studied in several investigations of comprehension monitoring, with conflicting results. For example, Paris and Myers (1981) embedded nonsense words (e.g., leets, klids) in short passages and instructed good and poor readers in the fourth grade to underline anything they did not understand. Only 25% of the nonsense words were identified by the good readers and 18.8% by the poor readers. Garner (1981) presented poor readers in the fifth and sixth grades with passages containing difficult vocabulary (e.g., multifarious, expeditiously) and asked the children to rate the ease of understanding the passages, justifying their responses. Nearly 100% of the difficult words were identified. The conclusion one might draw from the former study is that elementary school children infrequently use a lexical standard of evaluation; the conclusion one might draw from the latter is that they do so consistently. Several differences between the studies may underlie these discrepant results, two of which are the focus of the present investigation.

One factor which may affect the likelihood of reporting that a word comprehension failure has occurred is the length of the unknown word. Paris and Myers used short single-syllable

nonwords whereas Garner used long multi-syllabic words. Children may feel they should know the meaning of short apparently simple words and so are reluctant to acknowledge they do not. Children encounter long words less frequently in their day-to-day reading and so may feel it is more acceptable to indicate that they do not understand. In other words, a response bias may be operating. A second explanation for the hypothesized effect of word length concerns the role of decodability; shorter words are usually easier to decode than longer words. Research has shown that many younger and poorer readers equate successful reading with being able to pronounce all of the words (e.g., Garner & Kraus, 1981; Myers & Paris, 1978). This immature conception of reading would give children the illusion of comprehension if they could easily decode all of the words. Similarly, they would feel they did not comprehend a passage if it contained any words they were unable to pronounce.

A second factor which may influence whether or not a word comprehension failure is reported is the position the unknown word occupies in the sentence; that is, whether it plays the role of a noun, adjective, verb, etc. An efficient reader should be able to distinguish between those words that are central to the main point and those that modify or embellish it. Thus, he should know that unknown adjectives can often be safely ignored whereas unknown nouns cannot and so would be less troubled when encountering the former than the latter. The nonsense words used by Paris and Myers occupied the position

of nouns and were seldom identified; the unknown words used by Garner were adjectives and were consistently identified. On the surface, this pattern of results seems inconsistent with the hypothesized effect of sentence position. However, the knowledge that nouns are usually more crucial to comprehension than adjectives may be relatively late developing; neither study included a sample of older better readers.

The purpose of the present study was to determine whether word length and sentence position influence the likelihood of acknowledging that a word comprehension failure has occurred and the relative extent to which each factor is taken into account when deciding how detrimental an unknown word is to overall sentence comprehension. Third and fifth grade children, identified as skilled and less skilled readers, participated in two separate tasks. In the first task, subjects read 16 short paragraphs containing nonsense words varying along two dimensions: number of syllables (one vs three) and position in the sentence (noun vs adjective). Children were asked to report whether the paragraphs contained anything that might be hard for another child to understand. They were not specifically directed to focus on word understanding. In the second task, subjects evaluated the relative comprehensibility of pairs of sentences containing nonsense words differing in sentence position, number of syllables or both. Subjects were explicitly told that nonsense words were present to eliminate possible response biases regarding word length.

Method

Subjects. Subjects were 30 9-year-old children (M=9.01, SD=0.34) and 30 11-year-old children (M=10.98, SD=0.31) enrolled in the third and fifth grades, respectively, of two suburban elementary schools. Fifteen of the 9-year-olds were female and 11 of the 11-year-olds. Subjects were preselected for participation on the basis of their reading comprehension scores on the California Achievement Test taken earlier during the school year. Half of the children invited to participate had scores in the 80th or 90th percentiles and half had scores in the 30th through 55th percentiles. The mean percentile scores for the high-achieving 9-year-olds was 91.13 (SD=5.55) and for the lower-achieving 9-year olds, 43.80 (SD=8.18). The mean percentile scores for the high-achieving 11-year-olds was 92.60 (SD=5.50) and for the lower-achieving 11-year-olds, 41.00 (SD=9.42).

Materials. A total of 16 paragraphs were adapted from expository materials written for upper-elementary school children. The paragraphs dealt with a variety of topics including animals, planets, word origins, and ecological issues. The paragraphs were about 6 sentences in length (M=5.81, SD=0.91) and contained about 70 words (M=69.50, SD=9.61, range = 58 to 91). Each paragraph contained one sentence with an adjective-noun pair that was modified in four different ways. The four modifications were created by substituting a nonsense word in an orthogonal combination determined by number of syllables (one vs. three) and sentence position (noun vs. adjective). As an example, consider the

following original sentence and its four variants:

Original: Each of the elephant's legs is like a giant post, heavy and straight.

Variant 1: Each of the elephant's legs is like a giant hald, heavy and straight. (one syllable, noun position)

Variant 2: Each of the elephant's legs is like a hald post, heavy and straight. (one syllable, adjective position)

Variant 3: Each of the elephant's legs is like a giant halderon, heavy and straight. (three syllables, noun position)

Variant 4: Each of the elephant's legs is like a halderon post, heavy and straight. (three syllables, adjective position)

The nonsense words followed standard rules of English orthography. The one-syllable versions had four or five letters each; the three-syllable versions consisted of the one-syllable "root" with a two-syllable ending resembling typical suffixes (e.g., shant-shantarous; sart-sartifer; drent-drentation; parth-parthaten). The serial position of the sentence containing the nonsense word varied across paragraphs.

Each of the four versions of each paragraph was typed on a separate 5 x 7 note card. The cards were assembled into four sets such that each set included four instances of each problem type. The note cards were encased in clear plastic page protectors and were placed

in 3-ring binders for presentation to the subjects. The order of the paragraphs was the same across sets. For each set, the first four paragraphs contained one instance each of the four types of nonsense words; the second four also contained one instance of each type, and so on.

Materials for the paired-comparison task consisted of six pairs of sentences with nonsense words representing all possible combinations of the word length and sentence position variables. The two sentences in a given pair were identical except for the critical adjective and noun. In the example below, the contrast is a three-syllable adjective (3A) versus a one-syllable noun (1N):

a. The strange man went into the lorstafer store and disappeared.

b. The strange man went into the crowded lorst and disappeared.

Thus, the six contrast were as follows: 3A vs 1N; 3A vs 3N; 1A vs 1N; 1A vs 3N; 3A vs 1A; and 3N vs 1N.

Four different lists of the six sentence pairs were constructed. Two of the lists were identical except that the order of the pair members was reversed to control for possible response bias. The second two lists differed from the first two lists in the type of contrast contained within specific sentences (e.g., in the example above, the contrast was changed from 3A vs 1N to 1A vs. 3N). Each list of six sentence pairs was typed on a 5 x 7 note card. The sentences were numbered 1 through 6 and the first and second sentences

of each pair were labeled "a" and "b", respectively. The nonsense word in each sentence was underlined. The cards were encased in clear plastic and one card was placed in each binder behind a set of test paragraphs.

Procedure. The participants were tested individually in a vacant room at their school in a single session lasting 15 to 20 minutes. The paragraph evaluation task was always administered first and the paired comparison task second. (The reason for not counterbalancing order was that subjects were not told that the paragraphs contained nonsense words but they were told that the sentences contained nonsense words.This knowledge about the paired comparison task would have had an effect on the evaluation task had it been presented afterwards.) For the first task, subjects were told that the experimenter was trying to write some passages that children would find easy to understand and that she knew the ones she had with her today had some hard parts. The children were asked for their help in fixing them up. They were asked to read each paragraph silently and to tell the experimenter whether there was anything in it that a child their age or a little younger might have trouble understanding. The focus on another child was intended to encourage children to report nonsense words they may have been reluctant to admit they themselves did not understand. The experimenter recorded all nonsense words the children reported. Because the children were not specifically instructed to focus on word understanding, they occasionally reported other types of comprehension diffi-

culties. These too were recorded by the experimenter.

After the children read and evaluated the 16 paragraphs, they were given instructions for the paired-comparison task. They were first asked if they had ever come across a word they did not understand but were still able to get a general idea of the sentence's meaning. (All said yes.) Then they were asked if they had ever come across a word they did not understand that made the whole sentence hard to understand. (All said yes.) Then they were told that the purpose of the task was to find out the reasons for this difference. Subjects were shown the six pairs of sentences and were told that the underlined word in each sentence was a word we were sure they would not understand because it was a word we had made up. They were asked to decide whether one member of the pair was harder to understand because of its unknown word or whether both sentences were equally hard or easy to understand. For each pair, they identified "a" as harder, "b" as harder, or "a" and "b" as equally hard. Subjects gave their responses orally and were asked to explain the reasons for their judgments.

Results

Task 1, Paragraph Evaluation. Protocols were scored for the number of nonsense words of each of the four types that subjects identified. A 2 (grade) x 2(reading level) x 2 (number of syllables) x 2(sentence position) mixed analysis of variance was conducted on these data. The first two factors were between-subjects and the last two were within-subjects. The counterbalancing factor of sentence set was not included in the design because there would have been too few subjects

per cell. For the same reason, sex was not included as a factor.

The analysis revealed an expected main effect of reading level, $F(1,56)=9.53$; $p < .01$, such that the skilled readers identified more nonsense words that the less-skilled readers (62% vs 36%, respectively). Neither the main effects of grade or sentence position were reliable. However, the two factors interacted, $F(1,56)= 3,88$, $p=.05$. Third graders identified 47% of the nonsense words in adjective position and fifth graders 51%, a nonsignificant difference as revealed by Tukey's HSD test. In contrast, third graders identified significantly fewer nonsense words in the noun position than did fifth graders, 43% vs 56%, respectively. Neither the third graders nor the fifth graders identified reliably more of one type than the other. Thus, the hypothesis that subjects would be more likely to identify comprehension problems arising from an unknown noun was not supported. However, the interaction may reflect a developing sensitivity to the differential importance of nouns over adjectives.

The analysis also revealed the expected main effect of number of syllables, $F(1,56)=31.31$; $p < .001$. In addition, this factor also interacted with grade, $F(1,56)=3.95$, $p=.05$. Third graders identified substantially more three syllable nonsense words than one syllable (57% vs 32%, respectively), but the effect for the fifth graders was smaller and not statistically reliable (59% vs 47%, respectively). Thus, the younger children were more likely to acknowledge failures of word comprehension when the nonsense words were longer. Somewhat

surprisingly, less skilled readers did not show a similar bias relative to the more skilled readers (i.e., reading level did not interact with number of syllables).

Task 2, Paired Comparisons. Subjects' judgments as to which sentence in a pair, if either, was harder to understand were scored in two different ways. The first scoring system was based on the use of a noun-based decision criterion. This criterion, assumed to be characteristic of mature readers, was reflected in judgements that sentences with unknown nouns were harder to understand than sentences with unknown adjectives and that word length was irrelevant. Thus, for each of the four sentence pairs that contrasted sentence position, a "correct" selection was the sentence with the unknown noun. For the two sentence pairs which contrasted only number of syllables, a "correct" judgment was that there was no difference. The second scoring system was based on the use of a word-length decision criterion. This less mature criterion was reflected in judgments that sentences with longer unknown words were harder to understand than those with shorter unknown words and that sentence position was irrelevant.

Two 2 (grade) x 2 (reading level) analyses of variance were conducted, one on the number of judgments reflecting a noun-based criterion and a second on the number of judgments reflecting a word-length criterion. The only reliable effect in the first analysis was gradelevel, $F(1,56) = 5.04$, $p < .05$. For the fifth graders, 41% of the judgments were consistent with

a noun-based criterion and for the third graders, 29%. For the second analysis, the main effects of both grade and reading level were reliable, $F(1,56)=6.82$, $p < .05$ and $F(1,56)=10.48$, $p < .01$, respectively. The grade effect reflects a pattern opposite to that for the noun-based criterion, as one would expect: For the third graders, 64% of the responses were consistent with a word-length criterion and for the fifth graders, 50%. Additionally, less-skilled readers based more of their judgements on word length than did the skilled readers (65% vs 48%, respectively). One point that should be stressed is that few subjects were consistent in their criterion. That is, none of the 60 subjects based all six judgments on sentence position and only two based all judgments on word length.

Examination of subjects' verbal justifications revealed that several subjects used both criteria, justifying one choice on the basis of word length and another on the basis of sentence position. Additional criteria were also used, as shown in Table 1. A number of subjects indicated that sentences were easier to understand if the unknown word looked like a word they already knew. For example, one of the sentences was the following: "The men looked for the missing woleret until it became too dark to see." The comparison sentence was identical except the nonsense word "wole" replaced "woleret." One girl said the first sentence was easier because "woleret" looked sort of like "wallet." Unexpectedly, a number of subjects used a meaning-based criterion that identified adjectives as more crucial to compre-

hension than unknown nouns. For example, one of the sentences was the following: "Nobody knows why the boys got into a big frick." The comparison sentence differed in that frick was an adjective rather than a noun, "frick fight." One boy said that the first sentence was easier to understand because you know they got into something big; in the second sentence you have no idea what kind of fight it was. Overall, meaning-based criteria, regardless of type, were more frequent among the older children, whereas word-structure criteria were more evenly distributed.

Discussion

The present study demonstrated that both word length and sentence position influence children's evaluations of comprehensibility but that of the two, word length had a much more powerful influence. It was expected that word length would affect performance on the paragraph evaluation task, as it did. All children were more likely to identify nonsense words as difficult to understand if they contained three syllables rather than one. Skilled readers were as susceptible to this apparent response bias as less-skilled readers. However, increased experience with reading seemed to reduce the bias because the reporting advantage was not significant for the fifth graders. Overall, these results indicate that caution is needed in interpreting studies which find poor identification of problematic words. The data may reflect a response bias rather than a failure to monitor

comprehension. Discrepant findings in the literature may well be attributable to differences in the length of the problematic words.

Word length had an unexpectedly strong influence on children's paired-comparison judgments. The influence was unexpected because children were specifically told that none of the underlined words were real words. Nevertheless, longer nonsense words were thought to make the entire sentence harder to understand. The younger and less skilled readers were particularly likely to use word length as the basis for their judgments, but many of the older and better readers adopted a word length criterion as well. Because children knew that all of the words were nonsensical, their performance on this task cannot be attributed to a response bias; they did not need to acknowledge that they did not know the meanings of the words. These results, then, provide some support for the alternative explanation for the role of word length. As indicated in the introduction to this paper, some children believe successful reading involves being able to pronounce all of the words. As long as they can pronounce all of the words, they understand the sentence; meaning simply is not taken into account. Many of the children in the present study indicated that the ease of pronouncing a nonsense word did indeed affect their judgments: "It's a tongue-twister;" "I can't say it;" "It's harder to read;" etc.

With respect to sentence position, whether the nonsense word served as a noun or an adjective had relatively little influence on the likelihood of identification in the paragraph evaluation task. However, fifth graders were more likely to identify problematic nouns than were third graders, whereas the two grades did not differ in identification of problematic adjectives. This may reflect a dawning awareness that nouns are more crucial to comprehension, a suggestion which receives some support in the paired-comparison task. Fifth graders were more likely to use a noun-based decision criterion than third graders, but they were by no means consistent it its use. Nevertheless, this lack of consistency is not entirely attributable to their use of a strategy giving more weight to word length than meaning. Many fifth graders did take meaning into account, but in an unexpected direction; they felt unknown adjectives were more detrimental to comprehension than unknown nouns. This adjective-based criterion may reflect an intermediate point in development from use of the immature word length criterion to the mature noun-based criterion. However, work in progress suggests that it may be incorrect to assume that a noun-based criterion is any more mature than an adjective-based criterion. It appears that not only do college students apply adjective-based criteria,they also apply word length criteria! Nevertheless, the present study suggests a developmental shift from exclusive reliance on word length in evaluating comprehensibility to a consideration of both length and meaning, and finally to a consideration of meaning alone.

Table 1

NUMBER OF SUBJECTS GIVING EACH TYPE OF JUSTIFICATION FOR JUDGMENTS ON PAIRED-COMPARISON TASK

	THIRD GRADERS		FIFTH GRADERS	
	LESS-SKILLED READERS	SKILLED READERS	LESS-SKILLED READERS	SKILLED READERS
FOCUS ON WORD STRUCTURE				
LONGER WORDS HARDER	13	4	8	4
RESEMBLANCE TO REAL WORDS	0	8	3	2
FOCUS ON MEANING				
UNKNOWN NOUNS HARDER	0	4	6	6
UNKNOWN ADJECTIVES HARDER	0	1	2	7
OTHER USE OF CONTEXT	2	0	2	0

NOTE: SOME SUBJECTS GAVE MORE THAN ONE TYPE OF JUSTIFICATION.

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